

What Is Claimed Is:

1. A method for forming aluminum bumps by sputtering and chemical mechanical polishing comprising the steps of:

providing a pre-processed electronic substrate with a plurality of input/output (I/O) pads formed on a top surface;

depositing an insulating material layer on top of said plurality of I/O pads to a thickness that is substantially the thickness of Al bumps to be formed;

photolithographically forming a plurality of openings with one on each of said plurality of I/O pads;

sputter depositing a metal comprising Al filling said plurality of openings and covering a top surface of said insulating material layer;

chemical mechanical polishing said electronic substrate until a plurality of Al bumps is formed with a top surface of the bump flush with said top surface of the insulating material layer;  
and

removing at least partially a thickness of said insulating material layer by a wet etch process.

2. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of forming said plurality of I/O pads in a metal comprising Al.

3. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of depositing said insulating material layer of a thickness of at least 5  $\mu\text{m}$ .

4. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of depositing said insulating material layer of a material selected from the group consisting of silicon oxide, spin-on-glass and polyimide.

5. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of depositing said insulating material layer by at least two layers of different materials.

6. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of depositing said insulating material layer by a first layer of  $\text{Si}_3\text{N}_4$  or  $\text{SiO}_2$  and a second layer of polyimide on top of said first layer.

7. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of depositing said insulating material layer by at least two layers of different materials to a total thickness of at least 5  $\mu\text{m}$ .

8. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of depositing said insulating material layer by at least two layers of different materials to a total thickness between about 5  $\mu\text{m}$  and about 10  $\mu\text{m}$ .

9. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of sputter depositing a metal that consists of Al and Cu.

10. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of sputter depositing a metal that consists of Al and less than 3 wt. % Cu.

11. A method for forming aluminum bumps by sputtering and chemical mechanical polishing according to claim 1 further comprising the step of conducting said wet etch process incorporating buffered oxide etch (BOE).

12. A method for forming aluminum bumps on a semiconductor structure comprising the steps of:

providing a pre-processed semiconductor structure with a plurality of I/O pads on top;

printing a layer of polyimide-containing material having a thickness of at least 5  $\mu\text{m}$  on top of said structure forming a plurality of openings on each of said plurality of I/O pads exposed;

filling said plurality of openings with a metal comprising Al;

removing excess metal from areas other than said plurality of openings; and

removing at least partially said layer of polyimide-containing material by a wet etch process.

13. A method for forming aluminum bumps on a semiconductor structure according to claim 12 further comprising the step of forming said plurality of I/O pads in a metal comprising Al.

14. A method for forming aluminum bumps on a semiconductor structure according to claim 12 further comprising the step of printing said layer of polyimide-containing material by a screen printing or stencil printing technique.

15. A method for forming aluminum bumps on a semiconductor structure according to claim 12 further comprising the step of printing said layer of polyimide-containing material to a thickness between about 5  $\mu\text{m}$  and about 10  $\mu\text{m}$ .

16. A method for forming aluminum bumps on a semiconductor structure according to claim 12 further comprising the step of filling said plurality of openings with a metal comprising Al and Cu.

17. A method for forming aluminum bumps on a semiconductor structure according to claim 12 further comprising the step of removing excess metal until a surface of said metal in the plurality of openings is flush with a top surface of said layer of polyimide-containing material.

18. A method for forming aluminum bumps on a semiconductor structure according to claim 12 further comprising the step of removing at least partially said layer of polyimide-containing material by an etchant comprising HF and NH<sub>4</sub>F.

19. A method for forming aluminum bumps on a semiconductor structure according to claim 12 further comprising the step of removing at least  $\frac{1}{2}$  of a total thickness of said layer of polyimide-containing material to facilitate bonding to said Al bumps formed in said plurality of openings.

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20. A method for forming aluminum bumps on a semiconductor structure according to claim 12 further comprising the step of removing completely said layer of polyimide-containing material to facilitate bonding to said Al bumps formed in said plurality of openings.